MONTHLY WEATHER REVIEW.

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The MONTHLY WEATHER REVIEW is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by R. F. Stupart, Esq., Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Director Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian is used in the text of the MONTHLY WEATHER REVIEW.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea level and latitude 45°.

FORECASTS AND WARNINGS.

By Prof. ALFRED J. HENRY, temporarily in charge of Forecast Division.

The remarkable period of cold weather east of the Rocky Mountains which began in April came to a close in Texas, Oklahoma, Arkansas, and Louisiana in the early part of June. From the Lake region and the Ohio Valley eastward to the Atlantic it continued until about the middle of the month, thus completing a period of continuous cold weather in those districts which is unparalleled in the history of the weather service. Previous cold spells occurred in 1857, 1874, and 1875, but in these cases the cold weather did not extend into the month of June as in the present year. The effect of this cold weather was to greatly retard the growth of vegetation up to about the middle of the month. In Colorado and over the Rocky Mountain districts the cold weather of June prevented a rapid melting of the snow, and as a consequence there will be an abundance of water for irrigating purposes.

The month opened with a well-defined low (barometer, 29.50 inches,) central in southern Indiana, and a high (barometer, 30.10 inches,) central over New England. Altho pressure fell over New England and the Lake region, the center of this storm remained almost stationary for twenty-four hours, during which time a secondary center developed off the Virginia coast; in the meantime cloudy, rainy weather, with fresh northeast winds, prevailed over New England and the Middle Atlantic States and thence westward to Lake Michigan. Under the conditions as described, the temperatures ranged from 8° to 20° below the seasonal average thruout the region of easterly winds. The secondary center which developed over the Virginia coast on the 2d soon became the main storm, and as such drifted slowly northeastward along the coast. Meantime the drift of the surface winds over New England, the Middle Atlantic States, and the Lake region continued from an easterly quarter; the weather was therefore cloudy and cold with occasional rain.

An explanation of the failure of the Ohio Valley low to move in its normal path would throw much light on the cause or causes of the cold weather. Such failure can hardly be ascribed to the interposition of high pressure over New England, since the barometer continued to fall in that district. A second fact, that as yet lacks explanation, is that a shift of the winds from easterly to southerly, which almost universally causes a rise in temperature in Atlantic coast districts, generally failed to do so during the continuance of the cold weather. For example, on the 5th a well-defined area of low pressure, with fairly steep pressure gradients, past eastward from the Lake region to the mouth of the St. Lawrence. This storm caused the winds over New England and the Middle Atlantic States to shift to southerly, but the temperature did not rise as generally happens in a case of this sort. It would seem as if either the lower layers of the atmosphere were chilled to a great extent, both vertically and horizontally, or else the period of southerly winds was too short to actually transport warmer air from lower to higher latitudes.

The change in the drift of the highs and lows which terminated the cool weather in northeastern districts occurred on the 16th. Three days previous to that date an area of high pressure appeared over Lake Superior and gradually worked south-southeastward so that by the 16th it had reached the Ohio Valley with its longer axis running northeast and southwest.

The significance of a southward as compared with an eastward movement of an area of high pressure lies in the fact that the former gives an opportunity for the transfer of the balance of pressure from the north to the south, as a result of which the winds over the central valleys and northern districts become southerly and remain so until pressure in the northern part of the country again becomes greater than in the southern.

Normal temperatures were reached in northeastern districts on the 17th and continued thereabout until the closing days of the month when a repetition of the pressure conditions which had occurred earlier in the month caused two days of cold, rainy weather, with easterly winds in New England and the Middle Atlantic States.

A period of cold weather set in west of the Rocky Mountains on the 13th and continued with but little interruption until the 19th. During its continuance light to heavy frosts occurred in Nevada, Utah, northern Arizona, Colorado, and Wyoming and snow fell in the mountain districts of California, Oregon, Idaho, and Montana. A depth of 4 inches was recorded at Bellview, Idaho, on the 22d instant. Light snow was also recorded at Cleveland, Ohio, on the 5th, and frosts occurred east of the Rocky Mountains, as follows: Week ending June 3, light to heavy frosts were general in the Lake region, Ohio Valley, New England, and the Middle Atlantic States, light frosts also occurring as far south as western North Carolina, northern Alabama, and Arkansas; week ending June 10, light frosts occurred in the western portion of the upper Lake region and in the lower Lake region; week ending

June 16, light frosts occurred in exposed localities in the lower Lake region, and the northern part of the Middle Atlantic States on the 12th and 13th. Light frosts occurred on the cranberry bogs of New Jersey on the 13th.

Tornadoes occurred in Illinois, Indiana, and Kentucky on the 7th, and in Kansas on the 23d.

Thunderstorms were unusually numerous in Iowa, Nebraska, South Dakota, and Maryland on the 24th, and in New England on the 25th and 26th. Heavy rains fell in Tennessee on the 7th and 8th, and in Montana from the 20th to the 23d.

The weather in the British Isles was for the most part controlled by depressions moving in from the Atlantic, of which there was almost a constant procession during the first half of the month. The temperature was below the normal and there was considerable rain. High pressure prevailed in Iceland until the 6th; after that date the barometer was relatively low, under the influence of the depressions which moved northeastward over the British Isles.

Pressure was continuously high at the Azores with the exception of the 7th to 10th.

BOSTON FORECAST DISTRICT.

The first half of the month was unseasonably cold, with much cloudy and unsettled weather. The conditions changed on the 18th, and during the remainder of the month the weather was quite pleasant, with the daily temperatures generally above the monthly average. The mean temperature of the month, entire district, 62.2°, is 2.5° below the normal, and with the exception of 61.3° in 1902 and 59.5° in 1904, is the lowest for June during the last ten years. The precipitation was nearly normal. It was, however, unevenly distributed. The least rainfall was in Rhode Island and the greatest in Connecticut and in Maine. There were no severe windstorms during the month. Storm warnings were displayed on the 1st and on the 30th. Shipping experienced considerable delay and inconvenience from fog during the first half of the month.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

No special warnings were issued. There was no general storm along the Gulf coast during the month. Temperature conditions were moderate. The rainfall was deficient over the greater portion of the district.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

The month as a whole was cool; over a large portion of the western half of the district it was also dry. The rainfall at Louisville was the least for any June during the last thirty-six years. In the eastern half of the district, however, the monthly rainfall was normal, and in many places considerably in excess, altho mostly made up of a few heavy thundershowers. A number of damaging rains and one or two cloud-bursts occurred locally in Kentucky the first part of the month. The most damaging of these occurred the night of the 7–8th, when the town of Gradyville was practically wiped out of existence and 21 lives lost, due to a cloud-burst flooding Big Creek suddenly and sweeping away houses and people before the inhabitants became aware of the danger.

There were one or two quite cool periods but no frosts; also no unusually high temperatures occurred.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

Storms of moderate intensity visited the upper lakes on the 1st, 4–5th, 10–11th, and 30th. Lake interests were forewarned regarding these storms, and no marine casualties due to stress of weather have been reported.

Following the occurrence of frost in the Northwestern States on the 5th, temperatures did not exhibit notable features. Rainfalls were rather frequent and usually occurred in connection with thunderstorms.—*E. B. Garriott, Professor of Meteorology.*

DENVER FORECAST DISTRICT.

No special warnings were issued. The month was cool thruout the district, the deficiency in temperature being marked in New Mexico, western Colorado, and Utah. Several light frosts were noted in western Utah, and light to killing frosts at stations of high altitude. Rainfall was distributed irregularly, less than the normal occurring in sontheastern Wyoming, central Colorado, and in Arizona, and an excess in the remainder of the district. Dry weather in the central mountain region, and especially the prevailing low temperatures acted as a check on the melting of the snow; and instead of the snow-fed streams reaching unusually high stages, as might reasonably have been expected from the amount of snow on the upper drainage basins, the melting was relatively gradual. While high stages were general from the middle of June, the usual time of the maximum flow, the stages reached were not destructive. At the close of the month the highest point had not been attained in the upper reaches of many of the streams rising near the Continental Divide.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

The month was abnormal in the matter of rainfall, but about normal in temperature. At San Francisco the rainfall amounted to 1.28 inches, which is, with one exception, the largest June rainfall shown in a record covering fifty-seven years. In June, 1884, conditions were somewhat similar to those of the present year. The month began with unsettled weather in the northern portion of the State and there were frequent thunderstorms in the mountains. The pressure continued low over the Pacific slope for the first six days. The rain area seemed to move slowly southward and eastward, clear weather prevailing after the 8th. There was a return of the unsettled conditions on the 11th, and light rains were general in California and Nevada until the 15th. There was a heavy snowfall in the Sierra on June 11 and the amount on the ground at Summit was increased from 48 to 59 inches. The latter half of the month was more normal altho there were thunderstorms in the north on June 21 and 22.

There were no frost nor storm warnings issued during the month.—*A. G. McAdie, Professor and Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

There was but one storm of note during the month and it made its appearance off the Washington coast the evening of the 9th, and moved slowly northeastward. The disturbance caused general rains in this district for two days and unusually high winds for the season. Timely warnings were issued for the storm and no damage of consequence resulted therefrom. Light frost occurred in the interior of the district on several nights for which warnings were issued the previous morning.

The S. S. *President* sent this office the first wireless weather report ever received in this district at 10 p. m., June 18, 1907. The observation was taken in latitude 52° north and longitude 142° west, which is about 1100 miles northwest of Portland, Oreg.

The annual rise in the Columbia River was featureless. The river rose at Vancouver, Wash., from 18.5 feet on the 1st to 20.1 feet on the 10th. It then fell slowly and reached a stage of 17.3 feet at the end of the month. It is still above the flood stage at Vancouver, Wash., and Portland, Oreg.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

The floods of the month were more or less local in character. In no instance was the stage of water abnormally high, and nowhere were the losses and damage of great amount, except in western Montana and that portion of the Red River watershed lying in northwestern Louisiana above Shreveport and